Application Research on Customer Service Robot of State Grid E-learing Based on RPA Technology

Kaili Guo(✉), Guangpeng Liu, Jie Zhan, Zhuoyue Li, Zhe Zhang, Qianhui Yu, Yixing Qi, Guihua Lin, and Kai Zhang

State Grid of China Technology College, Jinan, China
guokaili2014@163.com, 674725759@qq.com, 13027078@163.com, 415207166@qq.com, zhezhangjlu@163.com, yuqh0312@163.com, 87788191@qq.com, 117036786@qq.com, zhangkaisgtc@163.com

Abstract. State Grid E-learing is an online learning service platform for the construction, promotion and application of State Grid Corporation of China, serving the training and learning of more than 1.5 million employees of the company. In order to explore and improve the customer service operation quality and efficiency of the State Grid E-learing, accelerating it's digital transformation of customer service profession, The RPA robot was applied to the business process of administrators based on State Grid E-learing and conduct case development for three commonly used typical application scenarios in this paper. The practical results show that the application cases developed in this paper can accurately and efficiently realize the automation of some74/ business processes of the State Grid E-learing, improve the efficiency and accuracy of operations, optimize the operating environment of the State Grid E-learing, and provide a strong support guarantee for further deepening the digital transformation of training work.

Keywords: RPA robot · State Grid E-learing · Customer Service · efficiency and accuracy of operations

1 Introduction

My country's "14th Five-Year Plan" proposes to "accelerate digital development and build a digital China", Accelerated the innovative application of digital technology, promote digital industrialization and industrial digitization, and release the multiplier effect of data. Promoting the all-round and full chain digital transformation of traditional industries and provide total factor productivity. Accelerating the wide application of digital technology is the only way for the high-quality development of enterprise training in the future [1]. As an online learning service platform for the unified construction, promotion and application of State Grid Corporation of China, State Grid E-learing carries various businesses such as company training and examination, knowledge integration, and talent development, serving more than 1.5 million registered employees of the company.

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Therefore, exploring and improving the quality and efficiency of State Grid E-learing's business and realizing digital transformation are of great value to online learning services for enterprises.

Robotic Process Automation (RPA) is a new type of automation tool that can automate the repetitive workflow based on fixed rules by simulating the interaction between humans and computers, improving work efficiency and job quality [2] In recent years, RPA technology has been successfully applied in many fields, including: finance and taxation, real estate, service, manufacturing, food testing and other industries.

This article will discuss the application scenarios of RPA based on the pain points of permission configuration and project creation in the online learning customer service of State Grid E-learing, which are not difficult but time-consuming and labor-intensive, analyze the increase effect obtained by using RPA in different business scenarios through statistical analysis. Practice has proved that the use of intelligent automation technology to replace manual tasks with low added value and repetitive tasks can improve business efficiency and operation accuracy, stimulate employees' innovation vitality, enhance the value of talents, and lay a good foundation for the digital transformation of enterprises [3].

2 Introduction to RPA Technology

RPA first evolved from BPA in the 1990s, and has now reached the 3.0 stage after years of technological development [4]. RPA is a technology based on artificial intelligence and automation, which can simulate the interaction process between humans and computers, execute workflow tasks with flow-based and highly repetitive, and realize tasks that only humans could complete in the past, thus effectively guaranteeing the timeliness of processing, avoiding work errors caused by human operation, truly achieving zero error, improving operation accuracy, and realizing business operation automation. At the same time, it can effectively improve work efficiency and business service level, fully liberate manpower, and reduce the burden on the grass-roots level. Functionally, using RPA can simulate manual operations to complete high-repetition, standardized, well-defined, and large-scale daily transactions.

3 Functional Framework of RPA

The three core technologies of RPA are screen capture, business process automation and artificial intelligence. After selecting the specified object, logical judgment can be used to simulate human behavior for mouse clicks and keyboard input, and finally form an automated process for stable operation. It can mainly realize five functions: first, data retrieval and recording, realizing the functions of data retrieval, data migration and data entry; second, image recognition and processing, realizing OCR identification, data review and analysis; third, platform upload and download, realizing the function of platform upload and platform download; fourth, data processing and analysis; fifth, information monitoring and output, Implementating functions such as workflow allocation, standard report issuance and automatic information notification [5]. The functional framework of RPA technology is shown in Fig. 1.

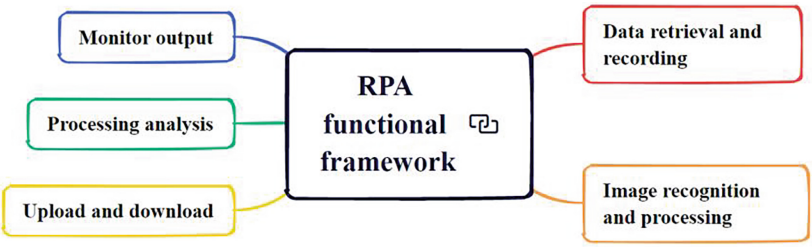

Fig. 1. RPA technology functional framework (Self-drawing)

4 Technical Characteristics of RPA

As a "digital employee", RPA process robots have the following four technical characteristics: First, they can handle repetitive and mechanical transaction operations; second, they can operate based on clear rules; third, they can be deployed in the form of plug-ins and simulate user behavior.; Fourth, it can completely simulate the manual operation of people in the computer to achieve machine processing.

According to pre-set rules, RPA technology replaces manual operations on the system interface to complete highly repetitive, standardized, clear rules, and large-scale daily business operations. Compared with traditional software, RPA has obvious advantages such as shorter development cycle, simpler design, more flexible implementation, and maintaining the integrity of the original system [6].

5 Typical Application Scenarios of RPA

5.1 Administrator Rights Configuration

The RPA robot logs into the office OA system, the unified authority management platform and the State Grid E-learing system respectively, to realize the automatic acquisition of administrator account information and authority information, and to complete the automatic configuration of data authority and functional authority. The RPA robot enters the user name and password to log in to the office system, automatically collects emails, reads email information, and obtains the name, organization, and personnel code of the administrator to be configured; The RPA robot logs in to the unified authority management platform, enters the authority management page, clicks the identity authority maintenance operation, selects the corresponding company through the benchmark organization tree, clicks to select the information of the second level company and the third level company in turn, and selects the subset principle to facilitate access to the search scope of the administrator who needs to configure the authority, enters the name and account information of the administrator who needs to configure the authority, and retrieves the user authority information, Select the permission content to be configured, set the default role, realize batch authorization, and complete the configuration of administrator function permissions. The RPA robot logs into the national network school platform, enters the system management page, clicks the data authority configuration operation, enters the name and account of the administrator to be configured, sets the

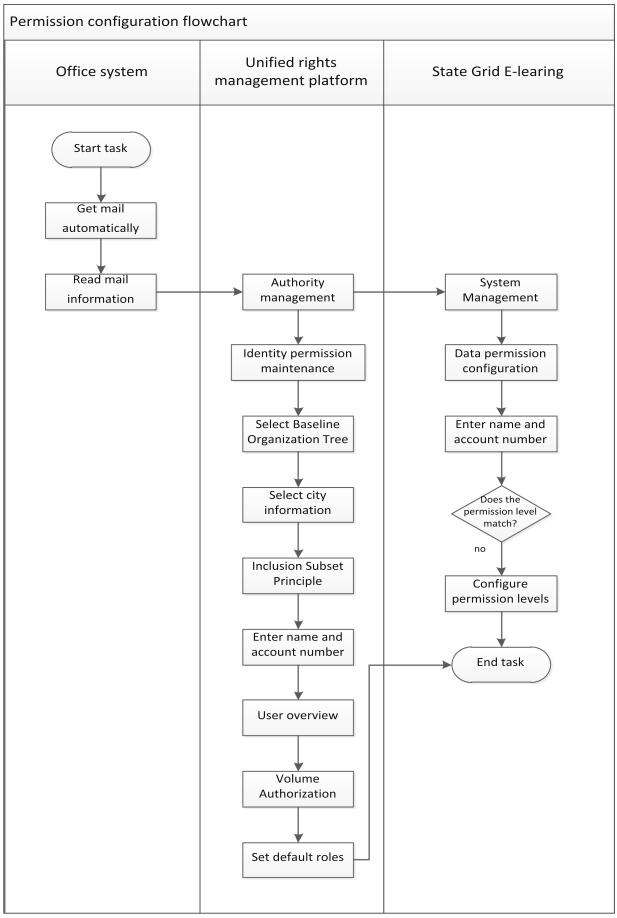

Fig. 2. Permission configuration flowchart (Self-drawing)

authority level of the administrator, and completes the configuration operation of the administrator's data authority. From the practical point of view, it takes about 1 min to manually input each data. After the introduction of the RPA robot, it only takes 10 s for a single administrator privilege configuration, saving a total of 14 h per thousand pieces of data. It greatly reduces the complexity of configuring administrator permissions for State Grid E-learing customer service, and improves the efficiency of configuring permissions by more than 83%. The process of configuring permissions is shown in the Fig. 2.

Figure 3 shows the comparison of the completion time of manual and RPA configurations for different permission contents.

5.2 Create a Training Course Project

The RPA robot automatically logs into the State Grid E-learing, creates a training course project based on the training course information, uploads courseware videos, and imports

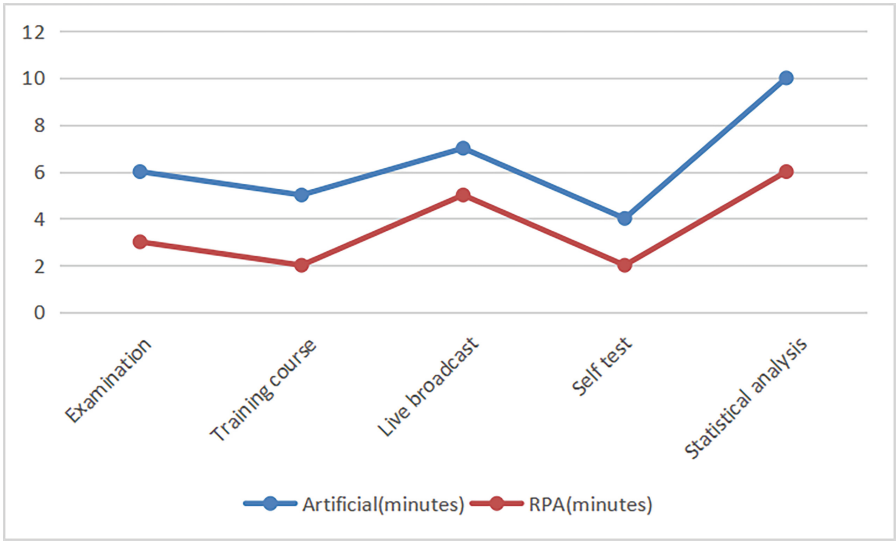

Fig. 3. Schedule of manual and RPA configuration for different permission (Self-drawing)

the list of learners. The RPA robot enters the user name and password to log in to the State Grid Academy, enters the training implementation page, clicks the training class management operation, fills in the basic information of the training class, such as the name of the training class, the level of the training class, the registration method, the start time, the end time, the check-in time, etc., uploads the course resources according to the course information, the course is associated with the training class, and creates a live broadcast project according to the actual needs, Create a self-test project according to the actual needs, upload the learning materials according to the actual needs, complete the basic information maintenance of the training class, and publish the training class project. Under the traditional model, State Grid E-learing has created 1,921 training class projects every year, and the creation of each project takes 10–30 min. Using RPA robots, the creation time of each project is 8 min, which increases the efficiency of training class project creation by 46.7%, an average annual saving of 13,447 h.

5.3 Create Exam Items

The RPA robot automatically logs into the State Grid E-learing, creates test items based on the test information, creates question banks, imports test questions, imports candidate lists, assigns exam rooms, arranges exam sites, and generates exam admission tickets. The RPA robot enters the user name and password to log in to the State Grid School, enters the management page of the test paper library, fills in the test paper project information, uploads the test paper content, and the test paper reviewer completes the review of the test paper content; Enter the exam management page, create a new exam item, fill in the exam item information, such as: exam start time, exam end time, whether to display scores and whether to enable switch authorization, etc., arrange the exam site, create the exam room, associate the exam item with the exam paper, import the exam personnel

information through ID number or personnel code, allocate the exam room, generate the exam permit, and publish the exam item. In the traditional mode, State Grid E-learing has 16,335 exam items every year, and each item takes 20–30 min to create. Using RPA robots, the creation time of each item is 12 min, which increases the efficiency of training course item creation by 52%. Cumulative savings of 212,355 h.

To sum up, the RPA robot can effectively simulate the interaction between humans and computers, and can realize simple and repetitive operations with clear rules. It replaces manual task processing with automated processing, and operates in a 7 × 24-h uninterrupted working mode [7]. In addition, operations such as login and data transfer are implemented between multiple different information systems, so as to maintain the integrity of the original system and realize the interaction and connection of multiple systems. At the same time, the RPA robot has highly adaptive and intelligent functions, supports multi-channel triggering and custom execution cycle functions, and enhances the flexibility of business processing [8].

The customer service robot of the State Grid Academy based on RPA technology has realized the digitalization, intelligence and precision services of enterprise training. It uses intelligent automation technology to replace manual work to complete low added value and repetitive tasks, further improve the work efficiency and operation accuracy, release a large number of human resources, improve the use experience of the platform, and promote the leapfrog development of digital transformation [9]. Figure 4 shows the comparison of the time for completing the manual and RPA configurations of training classes with different numbers.

The application time and efficiency of manual and RPA methods are shown in Table 1 according to the number of permissions, training classes and examination projects created by the State Grid School in 2021.

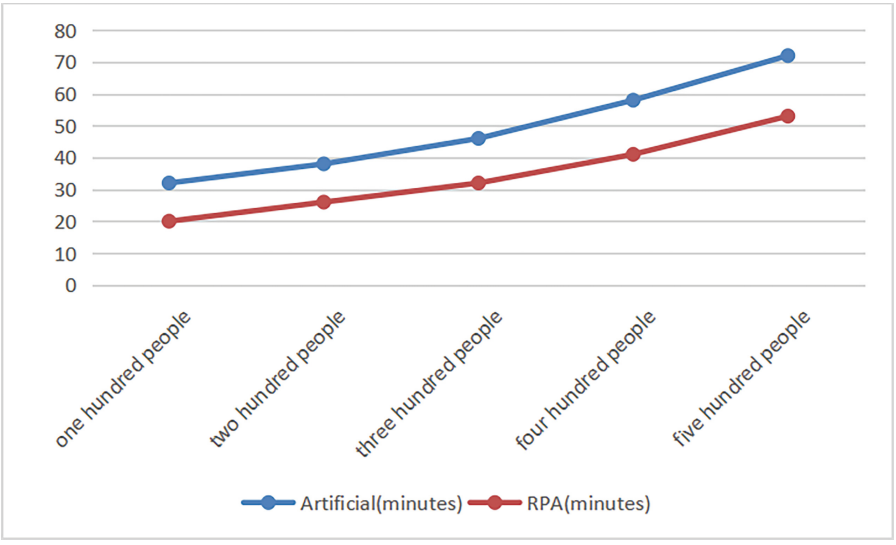

Fig. 4. Time comparison table for creating different number of examination items (Self-drawing)

Table 1. Time comparison table for creating projects in different ways (Self-drawing)

mode item	Configure permissions	Create training class	Create exam
RPA mode (min)	0.167	25	25
Manual mode (min)	1	8	12
Efficiency improvement (%)	83	46.7	52
Number of items	2801	13447	212355
Time saved (hours)	2333.4	1921	16335

6 Conclusion

RPA provides a new way of thinking and implementation for the digital transformation and upgrading of company education and training in the new era [10]. It uses accurate and efficient digital employees to innovate the system operation and data entry of online learning services, and realizes the "manual order, machine execution" function of online learning service work, which can effectively save manpower time, reduce management costs, and improve employee happiness.

In the follow-up, we will continue to analyze the various business operation processes of State Grid E-learing, expand the use scenarios of RPA in State Grid E-learing, and explore business scenarios such as business document acceptance, library sorting and classification, intelligent customer service, resource uploading, live broadcast creation, and training class management. RPA technology application scenarios, improve the digital application ability of the company's employees, and help the company's education and training business to transform from digital to intelligent. At the same time, AI-related technologies such as OCR recognition, NLP semantic analysis, and Chatbot chat robots are integrated to realize process automation with higher complexity and higher value [11, 12]. By combining cognitive automation with process automation, more intelligent automation scenarios are developed, and further improve the scalability of the system and improve the operational capabilities of the State Grid E-learing.

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